SHORT RESUME/ SYNOPSIS OF PH. D TOPIC

Entitled

"STUDIES ON TAXONOMIC DIVERSITY OF HELMINTH COMMUNITIES IN FRESHWATER FISHES"

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1. A BRIEF RESUME OF PROPOSED WORK / PROBLEM

Fishes form one of the most important group of vertebrates for man, influencing his life in various ways. Millions of human beings suffer due to hunger and malnutrition, and fishes form a rich source of food and provide a means to tide over the nutritional difficulties of man. In addition to serving as an important item of food, fishes provide several byproducts to us. Fish have considerable economic importance are useful as well as harmful to man. Fish have formed an important item of human diet. Nearly all fish freshwater and marine are edible and have been an important source of protein, fat and vitamins A and D since time immemorial. In most fishes, the flesh is white, contains about 13 to 20% of protein and has a food value of 300 to 1600 calories per pound. According to Pottinger and Baldwin, fish meat contains atleast 5 of the essential amino acids. Besides this, it contains vitamin A and D together with large amount of phosphorus present in it. Fish culture also has to deal with various pathogens like virus, bacteria, fungi and parasites. Helminths are an important group of pathogens, which cause infection and diseases of fish both in freshwater and marine environments, their importance being related directly to the fish that may affect the general public health. Fish parasites directly or indirectly related Human and animals health because several helminth parasites can be transmitted to humans and domestic animals only through fish. Keeping view in mind about importance of fishes for human, The present work is undertaken to study the taxonomic diversity of Piscean Helminth community.

2. Introduction To Proposed Research Topic:

India is the third largest fish producing country and the second largest aquaculture fish producer in the world. India contributes about 7% to the global fish production. The country is also home to more than 10% of the global fish biodiversity and is one of the 17-mega biodiversity rich countries and hosts as many as 55 families of freshwater fish Fishes used as food for human consumption 10 tons of fish are required to meet the annual demand of fish proteins. Around 14 million people are engaged in fisheries and its allied activities. The total fish production during 2017-18 is estimated to be 12.60 million metric tonnes, of which nearly 70%

is from inland sector and about 50% of the total production is from culture fisheries. More than 50 different types of fish and shellfish products are being exported to 75 countries around the world. Fish and fish products have presently emerged as the largest group in agricultural exports from India, with 13.77 lakh tonnes in terms of quantity and Rs. 45,106.89 crore in value. This accounts for around 10% of the total exports and nearly 20% of the agricultural exports, and contribute to about 0.91% of the GDP and 5.23% to the Agricultural GVA of the country. The major food fishes of India include *Labeo, Catla, Cirrhina, Mystus Mastacembelus, Wallago, Notopterus, Channa* etc. Fresh fish meat is usually cooked for human consumption. However, large quantities are refrigerated, salted, smoked, canned or pickled. Today, fisheries of the world carry on business worth several hundred thousand rupees annually and also provide employment to thousands of people.

Fishes are hosts to a number of parasites. Helminths are one of the major groups of fish parasites and cause a severe loss in the fish production (Jha et.al.,1992 & Sobecka and M. Słomińska, 2007). Fishes are infected with three major groups of helminths: the Platyhelminthes (flat worms), Nematoda (round worms), and Acanthocephala (spiny headed worms). About 20,000 to 30,000 helminth species have been reported worldwide, which cause heavy losses to the fish industry (Kime,1995). Dhar (1972) reported 31 species of helminth parasites from Kashmir valley which cause severe damage to the fish production and population. Globally, helminth infections have a major impact on the fish industry due to the pathogenic effects of several species affecting productivity, as well as because of the zoonotic potential of many species. Humans acquire fish-borne helminth zoonoses via the consumption of raw or undercooked fish containing infective parasite larvae (Tada et al., 1983; Chai et al., 2005). Because of the potential impact of fish parasites on public health and fish performance, as well as the importance of the fish industry and consumption in India. For that reason the present work is proposed to investigate the Studies on Taxonomic diversity of Helminth communities of freshwater fishes from Nanded District M.S. India

3. Survey or Review of Literature and Development in the Relevant Subject:

Fish parasitological investigation and research performed has been reviewed through study of available literature. Considerable works mainly on systematics, Morphotaxonomy, nature of infestation and pathology of different groups of fish parasites- protozoa, helminths and crustacea have been done. Till date, around 30,000 species of helminth parasites have been recorded from freshwater fishes. Some species of parasites have so far been recorded from

freshwater and marine fishes in India. Many workers studied different aspects of taxonomic diversity of helminth communities in the freshwater fishes. There are some pioneer workers in the world. Notable contributions to the biology of fish helminthes field were made by Yamaguti, S. (1934, 1958, 1959,1961), Woodland (1923, 1924), Anderson (1976), Wardle, R. A., McLeod, J. A. and Radinovsky, A. (1974) etc. In India, some of helminthologists who made extensive work in this fields are Johri (1959), Moghe (1925), Bhalerao (1932), Thapar, G.S. (1938), Sood, M.L.(1968) Ramadevi (1973), S.M.Ali (1956), M.Z.Chishti (2004), R.Madhavi (2007), Nama, H.S. (1974), S.P.Gupta (1953), Pandey, K.C.(2007), Tandon V. (2005), H. S. Singh (1995), Malhotra & Capoor (1980), Shinde, Jadhav, Hiware, Nanware, Bhure & his group (1970, 1980, 1984, 2005 & 2006,2008,2015,2016,2020) etc.

4. Objectives of the Research and Proposed Hypothesis: -

The objectives of the proposed study are as follows:

- To make survey of different freshwater fish species from Nanded District for Biosystematics of Helminth communities.
- Taxonomic identification of Helminth communities of freshwater fishes.
- To study the Taxonomic Diversity of Helminths of freshwater fishes.
- To study population dynamics of Helminth communities of freshwater fishes for incidence, intensity, density and index of infections.
- To study Biochemical Profile (Glycogen, Protein and Lipid contents) of Helminths and its host tissue.

5. Methodology to be Used and Adopted:

Different Freshwater fishes for present investigation will be procured from local fishponds and fish markets of Nanded Region, M.S. India. Identification of fish host will be made with help of classical works of Day (1865,1867, 1869,1875-1878,1879,1889), Jayram,(1981).

Helminths collected from freshwater fishes will be identified by -

1. Systema Helminthum Vol.I to III- By Yamaguti, S. (1958,1959, 1961)
2. Helminths, Arthropodes and Protozoa of Domesticated Animals-By Soulsby E.J.L. (1982)
3. Keys to the Cestode Parasites of Vertebrates- By Khalil, Jones and Bray (1994)
4. Handbook of Tapeworm identification –By Gerald D. Schmidt (1934)

- Population Dynamics Will be recorded and calculated according to Margolis et.al., 1982.
- Biochemical contents will be estimated by following standard methods.

1) Glycogen will be estimated by Kemp et. al., method (1954)

2) Protein will be estimated by Gornall et. al., method (1949)

3) Lipid content will be estimated by Folch et.al., method (1957)

Study Area:- Different collection sites of host in Nanded District of Maharashtra State, India.

6. Importance of study:

- **International Status-**

The helminth parasite fauna of freshwater fishes, its frequency and distribution have been studied in many parts of the world. Helminth parasite severely decreases fishes worldwide. If persons consumes such infected under-cooked fishes. It leads to high mortality thought world. The World Health organization (WHO) has estimated that number of peoples currently infected with fish borne Helminths. Fish constitute a major component of diet for the people. Helminths are an important group of pathogens, which cause infection and diseases of fish both in freshwater and marine environments, their importance being related directly to the fish that may affect the general public health.

- **National status:-**

Fisheries are an important sector in Indian economy. India has third position in fish producing countries in the world but it holds second rank in global inland fish production. Fish production is always under threat of attack from fish diseases caused by variety of fish parasites. Fish parasites and their infections are matter of concern since they affects the fish productivity by decreasing their reproductive potential, market and nutritive value. Infection of these parasites may result in poor growth, postpone sexual maturity and mortality of fishes, and cause human and animal diseases due to weak association of host and parasites. In India, parasitic diseases are most common (about 78 %) and are encountered more frequently than microbial diseases; however the degree of severity and losses due to such diseases are highly variable. Various workers in different parts of the country have studied the diversity of helminth fauna in India. It is expected that, Application of therapeutic measures to get rid of these pathogens requires a sound base of taxonomy.

- **Regional Status-**

The helminth parasite fauna of freshwater fish of Indian region ranks amongst the best characterised parasite faunas in World. During the past decade our knowledge of helminth parasites of freshwater fishes has increased dramatically. Knowledge of particular fish host determines identification of parasite with marked host and tissue specificity. Freshwater fishes are good sources of proteins. Several peoples consume fishes because of nutritional value but helminth affects the health of fishes and if we consume such kind of infected fishes causes diseases. The present study will be able to increase understanding about Taxonomic Diversity of Helminth communities of freshwater fishes from Nanded Region, which help to adopt control strategies against such infections.

- **Scope of Study-**

Parasitic diseases are the limiting factors in fish production, because of increased density of fish in water bodies where the fish pathogens can easily transmit from one fish to another. These pathogens may cause fish mortality in fishes where the entire fish population may be infected, resulting the great economic loss of fish farmers. Fish parasites directly or indirectly related Human and domestic animals health because several helminth parasites can be transmitted to humans and domestic animals only through fish. To provide a complete record of knowledge, this study is aimed to analyze the taxonomic diversity of helminth community of freshwater fishes.

7. Proposed work Plan with a Tentative chapter scheme:

1. Introduction
2. Preface
3. Review of Literature
4. Geographical Background of Research Area
5. Materials and Methods
6. Result & Discussion
    - I) Taxonomy of Piscean Helminth Parasites
    - II) Diversity of Piscean Helminth Parasites
    - III) Population Dynamics
    - IV) Biochemical Study
7. Summary & Conclusion
8. Bibliography

8. Proposed work Plan/ Formulation and Structure of Study:

First Year:- Review of Literature, Referencing, Research methodology, visit to various localities of Nanded district for collection of helminth parasites of freshwater fishes. Recording the obtained data for Population dynamics study. Collection and preservation of helminth parasites. To study Biochemical Profile (Glycogen, Protein and Lipid contents) of Helminths and its host tissue.

Second Year:- Collection of helminths of freshwater fish species from different localities of Nanded. Fixation, preservation, dehydration, staining and whole mount preparation of helminth parasites. To record the obtained data for population dynamics study. Data analysis. To study Biochemical Profile for Glycogen, Protein and Lipid contents of Helminths and its host tissue.

Third Year:- Collection, preservation, staining, mounting and identification of helminths on the basis of Systema Helminthum by S. Yamaguti. Morpho-taxonomic studies on helminth parasites of freshwater fishes. To record the obtained data for population dynamics study. Data analysis. To study Biochemical Profile for Glycogen, Protein and Lipid contents of Helminths and its host tissue.

Fourth Year:- Confirmation and finalization of obtained data for Biosystematics studies. Camera Lucida line drawings, morphometery, photomicrography, data analysis, drafting, typing and submission of thesis.

9. Expected Outcome:

Helminth infections inflict negatively on the production and well-being of animals including Freshwater fishes. After the completion of this study, It will help to know the Taxonomic diversity of Helminth communities of freshwater fishes from Nanded District M.S. India. The baseline information will helpful for successful formulation and implementation of an effective control strategy.

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